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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/501,865	07/20/2004	Takuo Hino	10873.1487USWO	6390
23552	7590	03/15/2005	EXAMINER	
MERCHANT & GOULD PC P.O. BOX 2903 MINNEAPOLIS, MN 55402-0903			GEBREMARIAM, SAMUEL A	
			ART UNIT	PAPER NUMBER
			2811	

DATE MAILED: 03/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/501,865

Applicant(s)

HINO ET AL.

AK

Examiner

Samuel A. Gebremariam

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 July 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____ | 6) <input type="checkbox"/> Other: ____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 7 and 14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 1 states third metal area on one hand and claim 7 states that the third metal area is a diffusion layer having conductivity. Claim 8 mentions a fifth metal area on one hand and claim 14 states a fifth metal area formed as a diffusion layer having conductivity. There appears to be a discrepancy in material selection between claims 1 and 7 and claims 8 and 14. Appropriate correction is requested.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Kato Rei, JP patent No. JP2001060661.

Regarding claim 1, Kato teaches a MIM (metal-insulator-metal) capacitor (fig. 1) comprising: a substrate (10); a first metal area (18); a second metal area (14) formed

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between the substrate (10) and the first metal area (18); and a first insulating layer (16) formed between the first metal area and the second metal area; wherein a capacitance value is determined by opposing surface areas of the first metal area and the second metal area; and further comprising: a third metal area (20) formed between the second metal area (14) and the substrate; and a second insulating layer (12) formed between the third metal area and the second metal area; wherein the third metal area is connected to a ground potential (refer to fig. 1).

5. Claims 8 and 9, are rejected under 35 U.S.C. 102(b) as being anticipated by Bonhoure et al. US patent No. 6,198,153.

Regarding claims 8 and 9, Bonhoure teaches (fig. 3) a MIM capacitor comprising: a substrate (21); a first metal area (27) and a second metal area (24) formed respectively opposing (first and second metal areas have opposing surfaces to the substrate) the substrate (21); a third metal area (26) formed between the first metal area and the substrate (21) so as to oppose the first metal area (27); a fourth metal area (23) formed between the second metal area (24) and the substrate so as to oppose the second metal area; and an insulating film formed between the first metal area and the third metal area, and between the second metal area and the fourth metal area (refer to col. 1, lines 25-33); wherein a first capacitance value is determined by opposing surface areas of the first metal area and the third metal area, and a second capacitance value is determined by opposing surface areas of the second metal area and the fourth metal area (capacitance can be established between any two parallel plates with a dielectric material between them); and further comprising a fifth metal area (25) formed in an

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electrically grounded (not floating) state between the third (26) and fourth (23) metal areas and the substrate so as to oppose both the third metal area and the fourth metal area.

6. Claims 11 and 12 are rejected under 35 U.S.C. 102(b) as being anticipated by Liu et al. US patent No. 6,198,153.

Regarding claim 11, Liu teaches (fig. 3) a MIM capacitor (24) comprising: a substrate (34); a first metal area (30) and a second metal area (32) formed respectively opposing the substrate; a third metal area (28) formed between the first and second metal areas and the substrate so as to oppose both the first metal area and the second metal area; wherein a first capacitance value is determined by opposing surface areas of the first metal area and the third metal area, and a second capacitance value is determined by opposing surface areas of the second metal area and the third metal area; and wherein the third metal area is formed so as to be in an electrically floating state (layer 28 is not connect to any point).

Regarding claims 11 and 12, Liu teaches (fig. 3) a MIM capacitor (24) comprising: a substrate (34); a first metal area (28) and a second metal area (32) formed respectively opposing the substrate; a third metal area (26) formed between the first and second metal areas and the substrate so as to oppose both the first metal area and the second metal area; wherein a first capacitance value is determined by opposing surface areas of the first metal area and the third metal area, and a second capacitance value is determined by opposing surface areas of the second metal area and the third metal area; and wherein the third metal area (26) is connected to a ground potential.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 2-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kato in view of Roy US patent No. (6,387,770).

Regarding claim 2, Kato teaches substantially the entire claimed structure of claim 1 above except explicitly stating that a surface area of a surface of the third metal area opposing the second metal area is smaller than a surface area of a surface of the second metal area.

Roy teaches (fig. 10) a capacitor structure (200) with upper and lower electrodes (202) and ((204) respectively where the surface area of the lower electrode is smaller than the upper electrode.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to adjust size of the second and third metal area of Kato's structure as taught by Roy in order to protect the third metal from damage during subsequent device fabrication steps.

Regarding claim 3, Kato teaches substantially the entire claimed structure of claims 1 and 2 above including a metal-free area (refer to the gap 214 and 216 of Roy fig. 10) formed in the third metal area is formed by a plurality of metal-free areas.

Regarding claim 4, Kato teaches substantially the entire claimed structure of claims 1 and 2 above including the plurality of metal-free areas are formed in parallel (refer to fig. 10, Roy).

Regarding claim 5, Kato teaches substantially the entire claimed structure of claims 1 and 2 above including the plurality of metal-free areas are formed intersecting (metal free areas 214 and 216 intersect regions 208 when viewed from the top, refer to fig. 10 Roy).

Regarding claim 6, Kato teaches substantially the entire claimed structure of claims 1 and 2 above including the plurality of metal-free areas are formed so as to be partitioned symmetrically to the third metal area (214 appears to be partitioned symmetrically to the third metal area (refer to fig. 10 of Roy).

9. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kato in view of Bonhoure.

Kato teaches substantially the entire claimed structure of claim 1 above except explicitly stating that the third metal area is formed as a diffusion layer having conductivity.

Bonhoure teaches a capacitor plate (22) that is formed of a polysilicon material (polysilicon needs to be doped to become conductive, hence a diffusion layer) in the structure of an intermetallic capacitor (fig. 3).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the metal layer of Kato with the diffused layer

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taught by Bonhoure in order to prevent the propagation of switching noise transiting through the substrate (col. 3, lines 51-54).

10. Claim 8, 10 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bonhoure in view of Mercier et al. US patent No. 4,323,948.

Regarding claim 8, Liu teaches (fig. 3) a MIM capacitor comprising: a substrate (21); a first metal area (27) and a second metal area (26) formed respectively opposing the substrate (lower portions of 26 and 27 oppose the substrate); a third metal area (25) formed between the first metal area (27) and the substrate (21) so as to oppose the first metal area (upper portion of 25 has an opposing face to 27); a fourth metal area (23) formed between the second metal area (26) and the substrate (21) so as to oppose the second metal area (26); and an insulating film (refer to col. 1, lines 25-33) formed between the first metal area (27) and the third metal area, and between the second metal area (26) and the fourth metal area (23); wherein a first capacitance value is determined by opposing surface areas of the first metal area and the third metal area (capacitance can be established between any two parallel plates with a dielectric material between them), and a second capacitance value is determined by opposing surface areas of the second metal area (26) and the fourth metal area (23); and further comprising a fifth metal area (24) between the third (25) and fourth (23) metal areas and the substrate (21) so as to oppose both the third metal area and the fourth metal area (opposing surfaces of 24 oppose both the third metal area and the fourth metal area).

Bonhoure does not explicitly state that the fifth metal area is formed in an electrically floating state.

Mercier teaches the use of a floating electrode (fig. 6) to form a capacitor with improved electrical stress capability.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to float the fifth metal area of Liu's structure as taught by Mercier in order to improve the over-voltage capability (col. 7 lines 65-68).

Regarding claim 10, Bonhoure teaches substantially the entire claimed structure of claim 8 above except explicitly stating that the fifth metal area is connected to the ground potential at a connection point such that impedance to the third metal area and impedance to the fourth metal area are substantially equivalent.

Parameters such as impedance in the art of semiconductor manufacturing are subject to routine experimentation and optimization to achieve the desired device characteristics during fabrication.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to connect the fifth metal at a connection point such that the impedance to the third metal area and impedance to the fourth metal area are substantially equivalent as claimed in the structure of Liu in order to apply the device that requires impedance matching.

Regarding claim 14, Bonhoure teaches substantially the entire claimed structure of claim 8 above including the fifth metal area is formed as a diffusion layer having conductive property. Bonhoure states that the metallization level (metal areas) in his invention means is either a polysilicon layer or a metal layer (col. 1, lines 30-33).

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Therefore Bonhoure teaches the fifth metal area as a diffusion layer having conductive property.

11. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Liu.

Liu teaches substantially the entire claimed structure of claim 11 above except explicitly stating that the third metal area is connected to the ground potential at a connection point such that impedance to the first metal area and impedance to the second metal area are substantially equivalent.

Parameters such as impedance in the art of semiconductor manufacturing are subject to routine experimentation and optimization to achieve the desired device characteristics during fabrication.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to adjust the impedance of the first metal area and impedance of the second metal area as claimed in the structure of Liu in order to apply the device that requires impedance matching.

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. References C and D are cited as being related to MIM capacitors.

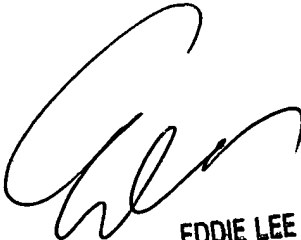
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Samuel A Gebremariam whose telephone number is (571) 272-1653. The examiner can normally be reached on 8:00am-4:30pm.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on (571) 272-1732. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SAG
March 3, 2005



EDDIE LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800